CLAIMS

[1] A method of preparing a solution having a composition of biological components changed to control the concentration ratio of albumin in the total proteins to be less than 0.3 by supplying a biological components-containing solution to a separation membrane having a 50 or higher comparative permeation ratio of at least β2-microgloblin to albumin and passing the solution through the separation membrane.

[2] The method of preparing the solution, wherein said separation membrane has a 70 or higher comparative permeation ratio.

[3] The method of preparing a solution according to the claim 1, wherein the concentration ratio is less than 0.1.

[4] The method of preparing a solution according to the claim 1, wherein the composition ratio of β2-microgloblin in the total proteins in the solution having a changed composition of biological components is at least 10 times as high as the composition ratio of β2-microgloblin in the total proteins in the biological components-containing solution.

[5] The method of preparing a solution according to the claim 4, wherein the ratio is at least 100 times as high.

[6] The method of preparing a solution according to the claim 1, wherein the flow parts in the inside of the separation membrane have an asymmetric structure.

[7] The method of preparing a solution according to the claim 1, wherein the biological components are a solution containing proteins extracted from substances derived from blood, blood plasma, serums, urine, ascites, saliva, tear, cerebrospinal fluid, pleural exudate, or cells.

[8] A solution for proteome analysis obtained by a preparation method according to one of the claims 1 to 7.

[9] An analysis method of proteins contained in biological

components by preparing a solution having a changed composition of the biological components by a method according to one of the claims 1 to 7 and then analyzing the proteins contained in the solution.

[10] The analysis method of proteins according to the claim 9, wherein means of analyzing proteins is at least one selected from mass spectrometry, electrophoretic analysis, and liquid chromatography.

[11] An apparatus for preparing a solution for proteome analysis having a changed composition of biological components, wherein the apparatus is an apparatus having a module containing a separation membrane having a 50 or higher comparative permeation ratio of β2-microgloblin to albumin and passing the solution through the separation membrane and the module has a raw liquid inlet for the biological components-containing solution in the raw liquid side of the separation membrane and an outlet of the filtrate passed through the separation membrane.

[12] A liquid flow channel for preparing a solution having a changed composition of biological components; comprising a module containing a separation membrane disposed therein and having a raw liquid inlet and a raw liquid outlet joined to a raw liquid side flow path of the separation membrane; a solution circulation channel communicating the raw liquid inlet and the raw liquid outlet and having a pump and an inlet for an object solution for separation in the middle; and a diluent solution inlet formed at a position upstream of the inlet for an object solution for separation or a position in the middle of the solution.

[13] An apparatus for preparing a solution having a changed composition of biological components, wherein the apparatus comprises at least two liquid flow channels according to the claim 12 and the outlet of the object solution for separation of one liquid flow channel is joined directly or indirectly to an inlet

for the object solution for separation of the other liquid flow channel.

[14] A method of preparing a solution having a changed composition of biological components with a module containing a separation membrane disposed therein by introducing a biological components-containing solution in the raw liquid side of the separation membrane, circulating the solution in the raw liquid side through a solution formed in the outside of the module, and taking out the solution passed through the separation membrane as the solution having a changed composition of biological components; wherein a diluting solution for the biological components-containing solution is additionally introduced into the raw liquid side of the separation membrane disposed in the module immediately after introduction of the biological components-containing solution.

[15] The method of preparing a solution having a changed composition of biological components according to the claim 14, wherein the separation is carried out under the condition satisfying $0 < Q2/Q1 < 1$ wherein Q1 denotes the flow speed of the biological components-containing solution introduced into the raw liquid side of the separation membrane and Q2 denotes the flow speed of the solution passed through the separation membrane.

[16] The method of preparing a solution having a changed composition of biological components according to the claim 15, wherein Q2/Q1 satisfies $0.005 \leq Q2/Q1 \leq 0.5$.

[17] The method of preparing a solution having a changed composition of biological components according to the claim 14, wherein the flow speed Q2 of the passed solution and the total flow speed Q3 of the biological components-containing solution introduced into the raw liquid side and the diluting solution satisfies $0.5 \leq Q2/Q3 \leq 1.5$.

[18] The method of preparing a solution according to the claim

17, wherein Q2/Q3 is about 1.

[19] The method of preparing a solution according to the claim 14, wherein a physiological salt solution or a buffer solution is used as the diluting solution.

[20] The method of preparing a solution according to the claim 14, wherein the biological components are substances derived from blood, blood plasma, serums, urine, ascites, saliva, tear, cerebrospinal fluid, pleural exudate, or a solution containing proteins extracted from cells.

[21] The method of preparing a solution having a changed composition of biological components according to the claim 14, wherein two modules are employed and a solution obtained by the method according to the claim 14 is used in a first module and the method according to the claim 14 is carried out by the second module.

[22] A method of preparing a solution having a changed composition of biological components from a biological components-containing solution by subjecting the biological components-containing solution to treatment in at least two steps; wherein the two steps are selected from (1) a step of adsorbing a portion or all of proteins having a molecular weight equal to or higher than that of albumin; (2) a step of removing a portion or all of proteins having a molecular weight equal to or higher than that of albumin by fractionation with a molecular sieve; and (3) a step of concentrating proteins.

[23] The method of preparing a solution according to the claim 22, wherein a material containing one or more substances selected from cellulose, cellulose acetate, polycarbonate, polysulfone, poly(methacrylic acid) ester, poly(acrylic acid) ester, polyamide, polyvinylidene fluoride, polyacrylonitrile, polyester, polyurethane, polystyrene, polyethylene, and polypropylene is used in the step (1).

[24] The method of preparing a solution according to the claim

22, wherein a separation membrane containing one or more substances selected from cellulose, cellulose acetate, a polycarbonate, a polysulfone, a poly(methacrylic acid) ester, a poly(acrylic acid) ester, a polyamide, polyvinylidene fluoride, polyacrylonitrile, a polyester, polyethylene, and polypropylene is used in the step (2).

[25] The method of preparing a solution according to the claim 22, wherein a separation membrane containing one or more substances selected from cellulose, cellulose acetate, a polycarbonate, a polysulfone, a poly(methacrylic acid) ester, a poly(acrylic acid) ester, a polyamide, polyvinylidene fluoride, polyacrylonitrile, polyethylene, and polypropylene is used in the step (3).

[26] The method of preparing a solution according to the claim 22, wherein a material fixing one or more substances selected from a group consisting of a polyethylene imine, an aminomethylpyridine, a polyphenol, a blue dye, a divalent metal ion, and an alkyl group-containing compound in the surface is used in the step (1) or the step (2).

[27] The method of preparing a solution according to the claim 22, wherein one or more substances selected from a group consisting of a surfactant, an emulsifier, an organic solvent, an alcohol, an ethylene glycol, a propylene glycol, a polyethylene imine, an aminomethylpyridine, protamine sulfate, ammonium sulfate, a polyphenol, a blue dye, a caotropic salt, and an alkyl-containing compound are added to an aqueous solution in the step (1) or the step (2).

[28] The method of preparing a solution according to the claim 22, wherein the biological components-containing solution contains a sample of human-derived components.

[29] An apparatus for preparing a solution having a changed composition from a biological components-containing solution, wherein the apparatus comprises at least two kinds of means joined

by a flow path and selected from (1) means of adsorbing a portion or all of proteins having a molecular weight equal to or higher than that of albumin; (2) means of removing a portion or all of proteins having a molecular weight equal to or higher than that of albumin by fractionation with a molecular sieve; and (3) means of concentrating proteins.

[30] The apparatus for preparing a solution according to the claim 29, comprising a liquid flow-out path to be joined to a liquid chromatograph, an electrophoretic apparatus, or a mass spectrometer.